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Proposed Legislative Program Rejected

The joint legislative committee of Florida's citrus industry meeting in Lakeland on December 2, flatly rejected the highly controversial enabling act to provide machinery for a state marketing agreement.

The proposed legislative program was vigorously opposed by the United Growers and Shippers Association, the Florida Independent Cash Buyers Association and by many of the large packing and canning concerns.

A representative of the Florida Farm Bureau stated that his organization objected to several minor points in the proposed legislative program.

Rejection of the proposed legislative program leaves the matter just where it was before the program was first presented and demonstrates conclusively that, as one citrus leader says, "we have no common ground on which to go to the 1953 state legislature on this matter." Without such united action it is felt that it would be useless to ask the legislature for specific citrus legislation.

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Vol. 33, No. 12 Bartow, Florida December, 1952

XUM

What Your University of Florida Agricultural Experiment Stations Mean to You

They threw away the textbook

and created a $9,000,000 crop

Twenty years ago Florida had two types of peanuts. One, a runner, gave heavy yields but the nuts were often very bitter. It was useful only for hog-feed. The other, the Spanish peanut, was rich and satisfying but tricky and uncertain of yield.

Could the two be crossed to get the best features of both and few of their faults? This is the kind of question that challenges the best efforts of your University of Florida Agricultural Experiment Station scientists. Two of them, Dr. W. A. Carver and Dr. Fred H. Hull, tackled and solved the problem.

First they had to explode the textbook belief that the yellow flowers of the peanut were sterile. Doctor Hull did this by working at night. He found that between 9 and 11 p.m. he could safely remove the pollen sacs from the blossoms. Early the next morning he applied this pollen to the blooms of the other variety, achieving finally the first artificial cross-breeding of peanuts in the United States if not in the world.

Early in 1933 the two scientists managed to cross the small white Spanish peanut with the Virginia Runner. Then Doctor Carver took the project alone and labored for 10 years until he had fully developed the now well-known Dixie Runner peanut.

Here was a peanut that gave heavy, reliable yields and that was literally "sweet as a nut" for eating.

Farmers in Florida, Alabama, and Georgia, knowing that there's profit in the Agricultural Experiment Stations' seeming magic, quickly began large plantings of the new peanut.

Today, this peanut and a new variety, Early Runner, that appears even better, mean a $9,000,000 crop for Florida. What's more, they mean better bacon, beef, and milk from cattle which eat peanut hay and peanut meal concentrate during poor pasturage months . . . more oil for deep-frying . . . and, of course, a better bag of salted peanuts at the ball game.

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Citrus Insect Control For December, 1952 . . .

W. L. THOMPSON AND R. M. PRATT*
CITRUS EXPERIMENT STATION,
LAKE ALFRED, FLORIDA

The average rust mite infestation has dropped considerably below that reached in late September, but the level is still high. The mites are now more abundant on leaves than on fruit. Purple mite activity is low and the population level has changed little since August, but a definitely increasing trend has appeared. If the weather continues cool and dry during December, a substantial increase may be expected.

Purple scale activity was not high at the time this was written, but there has been a considerable increase during November. The average red scale infestation has been almost unchanged at a low level since October.

Although scale and mite activity is not high at this time, with the exception of rust mite, the late fall and early winter are periods when comparatively low populations can cause serious damage. Leaf drop due to either scales or mites may be followed by extensive killing of twigs, and may also lead to a light crop next year. A comparatively light purple scale infestation at the stem end of the fruit may cause a heavy fruit drop. Neglect of rust mite control can result in a crop of rusty fruit, and undo all measures taken earlier in the season.

It must be remembered that even when the average infestation is low, there are always some groves with medium or high populations in which control measures are required.

Spray Programs

Scale infestations are at a medium to low level in most groves and unless a very heavy infestation of scale is present, it is probably advisable to wait until January or just before the spring flush of growth to spray. At that time any one or all of the following materials can be combined if parathion is used: wettable sulfur, DN compounds, borax and neutral compounds of copper, zinc and manganese. If oil is to be used it is much better to wait until just before the spring flush of growth, because an application at that time is not so likely to reduce the bloom as a December oil spray. Heavy infestations of either purple or red scale should be reduced at once to prevent fruit drop and leaf drop. Cold weather damage to trees heavily infested with scale has been much more severe than trees more or less free of them.

Even though the purple mite activity index is fairly low, these mites are present in most untreated groves. Inspect the exposed branches of the fall and summer growth and the tops of several trees if mites are not found within reach from the ground. If the mite population is low, it may be possible to delay treating until late December or early January. Inspections should be made every two weeks in groves where mites are present and no control measures have been taken. If mites or eggs become numerous, control measures should not be delayed until January.

Rust mites are capable of causing a leaf drop in much the same way that purple mites do if the leaves and green twigs become heavily infested.

While checking the groves for rust mites and purple mites, it is well to examine the under surfaces of the leaves for six-spotted mites. They are most likely to be found around a colony of purple scale on the under surface of a leaf and on rough lemon sprouts growing from a root. If six-spotted mites are found, the infestation should be kept in mind and the grove treated in January.

Scale Control: Where scale control is necessary a combination spray of 1 2/3 pounds of parathion and 5 to 6 pounds of wettable sulfur per 100 gallons is recommended. Apply the spray while it is calm and the temperature above 60 degrees. Although there has not been enough experimental data collected to determine the effect of parathion when it is applied during periods of relatively low temperatures, the average reduction in scale populations has been greater during the summer than during the cool winter months.

Purple Mite and Rust Mite Control: There probably will be more necessity for controlling mites than any other pests during this month. Either 2/3 pound of DN Dry Mix or 1 1/4 pounds of DN 111 per 100 gallons can be used for purple mites. If either of these two materials are in a concentrated spray, they can be reduced 25 per cent; that is, use six times the amount used in a dilute spray and apply one-eighth of the gallonage. Ovotran at one pound per 100 gallons can also be used. Thorough applications should be made regardless of the materials used. Wettable sulfur at 5 to 8 pounds per 100 gallons can be combined with any of the above materials for rust mite control. If it is desirable to apply a dust, it is recommended that a 1 1/2 per cent actual DN-sulfur dust be used. It should be well distributed over the trees. Where excessive amounts are applied on the fruit it may cause injury. Lime-sulfur is not effective for the control of purple mites and should not be used for that purpose.

Where heavy infestations of rust mites develop, a sulfur spray is more effective than a dust. To obtain a long period of control a more thorough application of sulfur is necessary during cool weather than in warm or hot weather. There is very little fumigating effect from sulfur during cool weather, so it is necessary to contact the mites with the sulfur. One gallon of lime-sulfur plus 5 pounds of wettable sulfur per 100 gallons is the most satisfactory winter spray for rust mite control. However, lime-sulfur should not be sprayed on Hamlin, Jaffas or tangerine trees if the crop has not been picked. Where purple mites are to be controlled at the same time, Ovotran can be used with the lime-sulfur but neither of the DN compounds are compatible with it. Wettable sulfur at 8 to 10 pounds is also effective. If the mite infestation is not heavy, a sulfur dust can be used. In many cases it is practical to apply the dust to keep the mite infestation at a low level until the dormant spray is applied.

For more detailed infermation refer to the 1952 "Better Fruit Program" or consult the Citrus Experiment Station at Lake Alfred or Fort Pierce.

*Written November 24, 1952. Reports of surveys by Harold Holtsberg, Cocoa; J. W. Davis, Lake Alfred; K. G. Townsend, Tampa; J. B. Weeks, Avon Park; and T. B. Hallam, Lake Alfred.

CITRUS NATIVE TO ASIA

The various species of citrus are believed to be native to Southern Asia, including South China, Indochina and the Malay archipelago.

Citrus Operations Being Taught To Polk County Vocational Agricultural Students

LEE H. SMITH, SECRETARY
BARTOW CHAMBER OF COMMERCE

Polk County's basic industry "Citrus" is being passed to the next generation of young people by the training our high school boys are receiving in Vocational Agriculture courses, being taught by six departments in the county. These Vocational Agriculture Departments are located in the following high schools of Polk County: Auburndale, Bartow, Frostproof, Ft. Meade, Kathleen, and Winter Haven. All of the Agriculture teachers in these high schools are using similar methods of teaching.

If you were young again, and back in high school in Polk County today and enrolled in a course of Vocational Agriculture, the training you would receive in citrus work would run something like this:

The first year you would learn in the classroom all about citrus varieties, citrus seed beds, and perhaps, citrus nurseries. The instructor would teach you these jobs by state and USDA bulletins, citrus text books, Florida citrus mutual and citrus commission pamphlets, film strips, and all other helps he might receive from commercial and state institutions. After your brain had been packed full of this "book learning", then you would be taken on a field trip to visit some successful citrus nurseryman in the community. Next you would be sent out to the school land laboratory and would actually identify citrus varieties, select your seeds for rootstock, prepare the ground and plant a citrus seed bed and nursery. By now you are saying to yourself, "Well, I know all there is to know about that part of the citrus business", but doing the job at school is not the last step. The instructor next insists that the boy go home and start him a citrus nursery of his own, and repeat the same operation at home. Remember now that all of this citrus work would probably be done in your first year of Vocational Agriculture along with other phases of agriculture such as soils, ornamentals, cattle, and poultry.

In your second year of agriculture you would take up something else in the citrus line. This year you would learn how to line out your citrus trees, select budwood, bud the trees, and fertilizing and care of young grove. To learn these things your instructor would carry you through the same steps of gathering material, studying, showing pictures, taking field trips, actually doing it on the school land laboratory, and then following it up at home by repeating what you had learned at school.

The third year, and you are really smart by now (almost a senior) you learn to prune, fertilize, protect from frost, identify insects and diseases, and apply sprays and dusts.

The last or fourth year the instructor would probably let you study about our marketing methods and marketing laws. After all, what would be the point of knowing how to grow the stuff if we could not sell it?

Different teachers in the county teach different ways, but believe me a boy in Vocational Agriculture today in our high schools learns the business of citrus, and other agriculture enterprises, from the ground up. They are learning by doing. If you doubt this I dare you to stop in and visit any of the Vocational Agriculture departments in Polk County or better still drop in on the Polk County Youth Fair in Bartow on December 11, 12, and 13, and see what these kids are doing in citrus work. Boys from all over Polk County will have citrus exhibits on display showing the different phases of citrus production that is mentioned above in this article. The kids of this great citrus county are behind the citrus industry; let's show the kids we are behind them and turn out for their youth fair in Bartow.

Received this information from Donald F. Padgett, Vocational Agriculture Department of the Auburndale High School.

His students plan appropriate exhibits at the Polk County Youth Fair December 11, 12, and 13.

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A Citrus Budwood Certification Program For Florida

R. S. EDSALL
AT MEETING FLORIDA
STATE HORTICULTURAL SOCIETY

Florida is now the largest citrus producing State in the United States even though the growers suffer tremendous annual loss from a large number of diseased, submarginal trees. A considerable percentage of the losses are caused by bud-transmitted diseases such as psorosis in its several forms. The California citrus growers were the first to recognize the importance of these bud-transmitted diseases and started a cooperative program to control psorosis in 1937. Texas followed with a similar, but improved, program in 1948. Florida is therefore the only major citrus producing state which does not have a program for the control of these diseases.

Recent studies of bud-transmitted diseases in Florida indicate that they constitute a serious economic problem and warrant a control program. Not only is there a serious direct loss of trees but also the fruit production of trees affected with psorosis is depressed as much as 10 to 35 percent below the average of healthy trees. Studies by Mr. Zack Savage have shown that a 1.0 percent reduction in the number of trees per acre caused a decrease of 1.6 percent in net profits. Furthermore, psorosis affected trees are much more susceptible to cold damage. In the 1950-51 freeze Mr. Carl Waibel observed, on the trees of the Texas Bud Certification program, that out of 54 trees affected with psorosis only 3 survived, but of 96 adjacent healthy trees all survived.

As the economic importance of these bud-transmitted diseases has become more widely recognized, and the growers began to feel the pinch in their pocketbooks, there was a demand for action. As a result a Panel Discussion on Nursery Stock Certification was included in the program at Camp McQuarrie in 1951. This brought out the need for, and the interest of the growers in a citrus budwood certification program for Florida.

The Florida Citrus Production Managers Association, realizing the tremendous annual loss to growers from psorosis and other bud-transmitted diseases, requested that Mr. Carl Waibel of the Texas State Department of Agriculture be invited to attend the 1951 Florida State Horticultural Society meeting and explain the successful citrus nursery stock certification program now operating in Texas.

After the members of the Horticultural Society learned of the success of the Texas program they passed a resolution favoring the immediate institution of a program for certifying citrus nursery stock free from bud-transmitted diseases. A standing committee was appointed to cooperate with the Florida State Plant Board, the Florida Agricultural Experiment Station, the United States Department of Agriculture Subtropical Fruit Station at Orlando, the citrus nurserymen, the Florida Citrus Production Managers Association and the Florida Agricultural Extension Service to formulate a plan suitable to the needs of the citrus industry in Florida.

This committee of the Horticultural Society, working in conjunction with representatives of all the above agencies, studied the best features of both the California and Texas programs and formulated a set of rules and regulations for a proposed Florida Citrus Budwood Certification program. This program goes further than the Texas and California programs in providing sources of budwood and nursery stock free, not only from such bud-transmitted diseases as psorosis in its several forms, but also xyloporosis, and other bud-transmitted diseases as they become known.

The program as planned is to

(Continued on page 10)

A Study of Hesperiden and Naringin From Citrus Fruits

J. W. KESTERSON AND
R. HENDRICKSON*
FLORIDA CITRUS EXPERIMENT
STATION, LAKE ALFRED

INTRODUCTION

In addtion to the more familiar components of citrus is a class of compounds called flavanone glucosides that have recently attained considerable biological importance. These glucosides occur only in small quantities, but are found widely distributed in nature. Although very little is known as to the purpose of these glucosides, it has been postulated by Hall (3) that hesperidin and perhaps other glucosides, can serve as a medium for the translocation of glucose synthesized in the chlorophyllous tissue. He further believed the glucoside to be combined with glucose, forming a soluble easily hydrolysable compound that can be temporarily withdrawn from metabolism until brought to that portion of the plant where it is to be stored or utilized.

The bitter principle extracted from grapefruit known as naringin is a characteristic feature distinguishing it from the other species of citrus. This glucoside is closely related to the nearly tasteless hesperidin of the sweet orange and to the bitter aurantamarin of the sour orange, but differing chemically from both.

Much attention was aroused in 1936 (6, 7) by an extract isolated from lemon that was found to improve the capillary fragility of ailing blood vessels. Though named "citrin", it came to be widely recognized as vitamin P, and has since been shown to be a mixture of hesperidin and eriodictin, a methylated isomer. Lemon juice contains more vitamin P than does orange juice and this in turn more than grapefruit juice. At the present time, there still exists some controversy as to whether vitamin P can properly be classified as a vitamin. Other flavanones have been found to be effective for similar therapeutic uses and in some cases naringin or naringenin has shown greater activity than hesperidin (1).

Besides these valuable uses for hesperidin and naringin, the authors have demonstrated them to be excellent intermediate for the prouction of light-fast azo dyes in a wide range of colors. These and other developments lead to the conviction that a possible new citrus by-product awaits commercial development. Although methods of recovery have been known for a number of years, much additional information is needed concerning the quantity of naringin and hesperidin in grapefruit and oranges, and how the recovery of this chemical can tie in with the present practices of handling and processing citrus.

In anticipation that hesperidin and naringin will become a valuable by-product of citrus, the principal purpose of this investigation was to determine the quantity and distribution of these glucosides in oranges and grapefruit from the ½ inch size to full maturity.

EXPERIMENTAL PROCEDURE

Varieties Investigated—The following varieties of oranges were studied for their hesperidin content: Hamlin, Parson Brown, Pineapple and Valencia. Also included in this glucoside study were the following varieties of grapefruit: Duncan, Marsh, Foster, Thompson and Ruby Red.

Method of Sampling—One fruit was picked at random from each of the following positions of the three, a total of 16 fruit being required for each sample.

East	West	North	South
Top Inside	"	"	"
Top Outside	"	"	"
Bottom Inside	"	"	"
Bottom Outside	"	"	"

Fruits for all of the varieties studied were taken from trees on rough lemon rootstock that had been on the standard cultural and spray practices as recommended by the Experiment Station in order to eliminate any differences due to these variables.

Method of Analysis—Extracts of the whole fruit or parts thereof were analyzed for naringin and hesperidin by the following adaptation of the Davis method (2). A 0.5 ml aliquot of the diluted extract or juice was added to 24 ml of 90 percent diathylone glycol and mixed. Thereafter 0.5 ml of approximately 4 N sodium hydroxide was added, mixed and the increase in color read after the prescribed length of time in a Fisher electrophotometer using a 425 mu blue filter (naringin—10 minutes, hesperidin—30 minutes). The development and reading of the color was made at approximately 25°C. and compared against standard curves to determine percent by volume of naringin and hesperidin.

EXPERIMENTAL RESULTS AND DISCUSSION

Glucoside Content of Whole Grapefruit and Oranges—In this study of the glucoside content of grapefruit and oranges, the physical dimensions and wet and dry weight of the fruit as well as the glucoside content were recorded for Duncan grapefruit and Valencia orange as shown in Tables 1 and 2. Since these two varieties are similar to those of the other varieties in their respective groups they are used to exemplify the varieties studied.

Since high percentages of naringin and hesperidin were found in small fruit 1 to 1½ inches in diameter it seemed advisable to make some determinations on fruit one-half inch in diameter the following year. These values are included as the first entry in Tables 1 and 2. It can be computed from these data that on a dry weight basis ½ inch caliper Valencia oranges and Duncan grapefruit contained 39 and 76 percent of their respective glucosides. From these tables it can be seen that the quantity of glucoside per fruit increased until the grapefruit and oranges reached an equatorial diameter of about two inches and then remained fairly constant, based on quantity per fruit, for the remainder of the fruit season. However, due to the increase in the size and weight of the fruit the percentage of glucoside decreased. The noticeably

*Presented before the Florida State Horticultural Society in St. Petersburg, Florida, November 7, 1952.

high concentration of naringin and hesperidin in small grapefruit and oranges would indicate that the physiological function of these glucosides, though not clearly established, is an important one.

In expectation that the naringin and hesperidin content of grapefruit and oranges would in some way correlate with the maturity of the fruit, the degree Brix, per-

shown in Table 1 that almost 90 percent of the naringin in Duncan grapefruit is concentrated in the albedo, rag and plup and this was also true for the other varieties

TABLE 1. Monthly Variation in Whole Fruit, Juice and Glucoside Content of Duncan Grapefruit*.

	Blk. VII				Row E			Tree 2			
	Whole Fruit				Juice			Distribution of Naringin—%			
Date	Diameter in.	Wet wt. gms.	Dry wt. gms.	Naringin content gms.	°Brix	Acid %	Naringin content % by Vol.	Juice	Albedo	Flavedo	Rag & Pulp
4/28/52	0.50	1.52	0.33	0.25							
5/1/51	1.2	14	4.3	1.4							
6/1/51	2.3	76	16	2.4							
7/1/51	2.3	184	32	2.6							
8/1/51	3.7	306	48	2.8							
9/1/51	3.8	377	57	2.1	8.4	1.9	0.031	1.5	49.0	7.1	42.4
10/1/51	4.2	506	76	2.6	9.8	1.6	0.024	1.3	53.2	8.4	37.1
11/1/51	4.5	577	92	2.5	8.9	1.7	0.028	2.4	59.0	5.8	32.8
12/1/51	4.6	619	102	2.6	10.5	1.8	0.032	3.0	59.8	5.6	31.6
1/1/52	4.7	670	108	3.0	10.4	1.5	0.036	3.1	61.7	3.8	31.4
2/1/52	4.8	742	125	3.1	10.3	1.6	0.030	2.8	56.2	4.9	36.1
3/1/52	4.6	666	119	2.6	11.6	1.7	0.022	2.2	55.6	4.3	37.9
4/1/52	4.8	721	112	2.5	10.5	1.4	0.016	2.9	58.3	3.5	36.3

*Average value for either 8 or 16 fruit.

TABLE 2. Monthly Variation in Whole Fruit, Juice and Glucoside Content of Valencia Orange*

	Blk. II				Row 9			Tree 8			
	Whole Fruit				Juice			Distribution of Hesperidin—%			
Date	Diameter in.	Wet wt. gms.	Dry wt. gms.	Hesperidin content gms.	°Brix	Acid %	Hesperidin content % by Vol.	Juice	Albedo	Flavedo	Rag & Pulp
4/28/52	0.50	1.20	0.39	0.15							
6/1/51	1.4	23	6	0.7							
7/1/51	1.9	51	11	1.0							
8/1/51	2.1	77	14	1.0							
9/1/51	2.5	124	20	0.8	7.8	3.2	0.022	1.4	33.0	23.2	42.4
10/1/51	2.7	145	21	0.7	7.5	2.8	0.025	2.4	37.9	20.0	39.7
11/1/51	2.9	189	27	0.8	7.9	2.1	0.019	1.9	30.2	18.2	49.7
12/1/51	3.1	231	35	0.9	8.7	1.6	0.015	1.8	33.6	22.3	42.3
1/1/52	2.9	218	33	1.0	9.7	1.4	0.018	2.0	38.1	18.4	41.5
2/1/52	3.1	254	39	1.0	9.5	1.1	0.019	2.6	29.8	19.1	48.5
3/1/52	3.0	240	37	1.0	10.4	1.1	0.019	2.3	32.1	18.1	47.5
4/1/52	3.1	250	40	1.0	10.7	1.0	0.024	2.9	30.1	18.6	48.4

*Average value for 16 fruit.

The total naringin content for the different varieties of grapefruit established Foster to have the highest content and Thompson the lowest on a whole fruit basis. If the varieties are arranged in order of decreasing naringin content on a per fruit basis, the following order is observed: Foster, Duncan, Ruby Red, Marsh and Thompson. This order indicates that the glucoside content is closely related to the total weight of the fruit. In other words the larger sized fruit contain the greater quantity of naringin. In other words the larger sized fruit contain the greater quantity of naringin.

The total hesperidin content for the different varieties of oranges established Pineapple to have the highest content. It was further found that the quantity of glucoside per fruit closely approximated its wet weight, which was represented by the following decreasing order: Pineapple, Parson Brown, Valencia and Hamlin.

Glucoside Content of Juice—cent acid and percent glucoside by volume were determined and are presented in Table 1 and 2. Degree Brix was determined by refractometer at 28°C. and percent acid by titration with alkali using the standard method of the citrus industry.

Since previous work by Maurer et al., (5) showed a significant relationship between the naringin content of grapefruit and its maturity, some hope was held for finding a similar relationship for Florida oranges and grapefruit. Unfortunately, this observation was not borne out by the grapefruit and orange varieties studied. Neither Brix, percent acid nor ratio could be correlated with the percent glucoside in the juice or its distribution in the fruit. The percent hesperidin in the juice of oranges was found to vary between 0.015 to 0.025 percent while naringin in grapefruit juice varied from 0.016 to 0.036 percent for most of the season.

Distribution of Glucosides—It is

of grapefruit studied. Also, it is shown in Table 2 that 75 to 80 percent of the hesperidin in Valencia oranges was concentrated in the albedo, rag and pulp. This also holds true for the other orange varieties. Thus, any attempt to obtain higher juice yields by increased pressure or deeper burring by juice extractors would tend to increase the glucoside content of the juice (4). In this work, the fruit extracted to produce the greatest juice yield contained the highest concentration of glucoside in the juice.

SUMMARY

An investigation of the glucoside content of grapefruit and oranges led to the following conclusions:

1. The glucoside content of four varieties of oranges and five varieties of grapefruit was found to be rather constant once the fruit had grown beyond an equatorial diameter of two inches. Thereafter, as the fruit grew larger, the glucoside content of all varieties

(Continued on page 12)

XUM

Preparation of Tangerine Puree

GRAY SINGLETON
AT MEETING FLORIDA STATE
HORTICULTURAL SOCIETY

This work was undertaken with the idea that, if the delicious fragrance and aroma of fresh tangerines could be captured, the resulting product would be an excellent flavoring for ices, sherbets and ice cream.

On March 16, 1944, attempts were made to can tangerine puree made by splittting the fruit and running it through a Chisolm-Ryder, screw type finisher with a screen having .027 inch perforations. The produnct was divided into four parts and recoverable peel oil determinations were made as follows:

TABLE I.

Lot No.		
1	Fresh puree	.105% recoverable peel oil.
2	Boiled but not skimmed	.095% " " "
3	Boiled and foam skimmed off	.025% " " "
4	Deoiled at 15" vacuum through 1" orifice for 30 seconds	.017% " " "

Samples of each lot were heated to 195 degrees, F., and sealed in No. 2 cans. All samples were stored at room temperature and tested at monthly intervals.

Samples 1 and 2 were definitely off flavor at 60 days and were discarded.

Samples 3 and 4 retained a fairly good flavor for one year but were lacking in aroma and bouquet.

Lot 1, when freshly prepared, required only 7 ounces to give excellent flavor to 1 gallon of sherbet mix. Lots 3 and 4 required 30 to 35 ounces of puree, per gallon of mix, and the flavor was rather flat.

This test indicated that the amount of recoverable peel oil present in the puree was a major factor in flavoring power. On January 9th, 1945, a second attempt was made to can tangerine puree, using the same finisher and screen as in the previous test. In order to get more peel oil from the peel the finisher was set to give more pressure. The pressure was varied on different batches to control the amount of oil in the puree. Results were as follows:

TABLE II.

Lot No.		
1	Fresh puree, high pressure	1.090 recoverable peel oil.
2	Fresh puree, medium pressure	.612 " " "
3	Fresh puree, lower pressure	.421 " " "
4	Fresh puree, low pressure	.117 " " "

Sherbet made from these samples showed that Lots 1, 2 and 3 were bitter. Lot 1 was very bitter. No bitterness could be detected in lot 4.

In running lot 1 the screen burst in the finisher. A reinforced screen was made. It swelled somewhat but did not burst.

Using lot 4, table II, samples were prepared as follows:

TABLE III.

Lot No.	
1	Canned at 195 degrees, F., without treatment
2	Peel oil removed in a MacKinnis still. Recoverable discarded. Distilled water, in amount equal to condensate, added to puree before canning. Canned at 195 degrees, F.
3	Peel oil removed in MacKinnis still and both recoverable peel oil and condensate added back to puree before canning.
4	Peel oil removed in MacKinnis still and condensate, only, added back to puree before canning at 195 degrees, F.

Samples were stored at room temperature and tested monthly. Lot showed off flavor at 60 days and was discarded. Lot 2 retained good flavor for one year but had little bouquet and aroma. Lots 3 and 4 were off flavor in 60 days.

In pasteurizing the samples in Table III, part of each lot was canned at 190 degrees, 195 degrees and 200 degrees, F. Vacuum readings were taken as soon as the cans were cooled to 70 degrees F. Samples were stored at room temperature and vacuum readings were again taken at the end of one year. Since there was considerable difference in the same lot, especially in lots 3 and 4, 20 cans of each lot were used in order to get a good average. Table IV shows the average vacuum after one year:

Lot 1 showed little etching of the cans, lot 2 showed no etching at all and lots 3 and 4 showed very bad etching. A few cans of lots 3 and 4 perforated before the year was ended. Lot 1, at both 190 and 200 degrees, showed variation of from 9 to 14 inches of vacuum at the end of the year.

Lot 2, both 190 and 200 degrees, showed variation of only 1 inch at the end of the year.

Lot 3, at 1950 degrees, varied at the end of the year from 9 inches of vacuum to 4 inches of pressure. Lot 3, 200 degrees, varied from a vacuum of 8 inches to pressure of 3 inches.

TABLE IV.

Lot No.	Vacuum at start	Vacuum after 12 months, 70 degrees
1	190 degrees, 17 inches	11 inches
1	200 degrees, 18 inches	11.5 "
2	190 degrees, 17 inches	16.5 "
2	200 degrees, 18 inches	17.0 "
3	190 degrees, 17 inches	3.5 "
3	200 degrees, 18 inches	4.0 "
4	190 degrees, 17 inches	3.0 "
4	200 degrees, 18 inches	3.5 "

Lot 4, at both 190 and 200 degrees, F., showed the same variation, from vacuum of 9 inches to pressure of 4 inches. Something in the condensate caused off flavor in lots 3 and 4 and caused etching of cans and loss of vacuum.

The data indicate that there was a change in the composition of the deleterious ingredients when they were removed from the puree and then put back into it. They were much more active when removed from the puree and then put back than when they were left in without removal.

In May of 1946 samples were prepared with high, medium and low pressure on the finisher. The results were much the same as shown in Table II. The low pressure samples showed recoverable peel oil of .104%. Some of these

low pressure samples were heat sterilized and canned. Other samples in the low pressure lot were sealed raw and stored at 35 degrees, F., and at -10 degrees, F. All samples were tested at monthly intervals. The heat sterilized samples, stored at room temperature, were off flavor at the end of thirty days.

The samples sealed raw and held at 35 degrees, F., held their flavor for two months but, at the end of the third month had a poor flavor and a high mold count.

Samples of raw puree held at -10 degrees, F., showed no deterioration or loss of flavor at the end of one year. Some of these samples were held for two years and still showed no change that could be detected by taste panels.

On November 20th, 1946, samples of tangerine puree were put up under low pressure from fruit that appeared to be mature and had passed the State maturity test. Even though extracted under low pressure these samples were bitter when first processed and had low flavoring power. Only -10 degree storage was used on these samples.

Since the samples put up late in the Spring, under the same conditions, had high flavoring power and were not bitter, it was decided to put up samples each month to see what changes could be noted as the season advanced.

On December 15th the samples processed were bitter but not as bitter as those put up in November.

Samples put up on January 12th had no bitterness but were rather low in flavoring power, requiring 9 ounces per gallon of mix to give good flavor. Sample were processed each month through July, when the last of the late bloom tangerines were available. Flavoring power and aroma increased each month to the end of the test, even though the fruit was half dry at the end.

During the winter and spring of 1948-49 a number of tests were run to determine the best screen size. The extractor used was a pulper manufactured by Food Machinery Corporation which removed the juice and pulp with very low pressure. Screens with perforations of .020, .027, .042 and .062 inches were used. In all cases the mix was 3 parts of fruit to one part of sugar. Table V shows the yield of finished puree per 90 pound box of fruit:

TABLE V.

Screen	Yield, per box of fruit.
.020	29 pounds
.027	38 pounds
.042	48 pounds
.062	59 pounds

Screen size .062 was ruled out because it allowed the seed pips to go through and taste panels did not like to see these undeveloped seed in the sherbet.

The other three screen sizes gave excellent flavor as judged by the taste panels. No difference could be detected between the three in sherbets and ices but the .042 product could be seen in ice cream while .020 and .027 could not. Some ice cream manufacturers like to have these small pieces of fruit pulp in their products to show the consumer that the flavor is not synthetic.

Screen sizes .020 and .027 gave rather slow production in the pulper where pressure could not be applied. Size .042 gave comparatively rapid production. The average time required to process a 90 pound box of fruit was as follows:

TABLE VI.

Screen	Minutes, per box of fruit
.020	17
.027	13
.042	2

Tangerine puree extracted in a paddle finisher, or pulper, seems to have a better flavor than when prepared in a screw type finisher. This may be due to the fact that there is always the tendency to get more yield by putting more pressure on the screw type finisher. The pulper avoids this temptation since high presure cannot be applied.

Commercial scale consumer acceptance tests were started in 1948. Tangerine puree can be made with or without sugar but it is customary to furnish the ice cream manufacturer with a product that meets his regular formulation. If he uses three parts of fruit to one part of sugar he wants all of his fruits to have this ratio. This was the ratio used in all tests made in 1948.

The manufacturers cooperating in these tests were:

Cone's Dairy Plant City, Fla.
Schneider Ice Cream Co. Eustis, Fla.
Pipkin's Dairy Lakeland, Fla.

The puree was prepared by splitting the whole tangerines, extracting the juice and pulp in a pulper, mixing with sugar and freezing at -17 degrees, F. Storage was at -10 degrees, F.

Tangerine sherbet was put on sale by these three dairies without advertizing or promotion of any kind. The first tests were in the school lunch rooms where it was an immediate success. Sales through all outlets increased steadily until, in 1950, reports indicated that tangerine outsold all other sherbets combined. After three years of testing various mixes, shades of color, sweetness and other factors that influence repeat sales the product was released for commercial production during the winter of 1951-52. The formula that got the best acceptance was substantially the same as that worked out by Mr. Owen Bissett, at the USDA Citrus Products Laboratory in Winter Haven. It is as follows:

Tangerine puree, ...8 oz.
Gelatin, ...½ "
Milk solids, serum or fat, ...3%
Sucrose, ...2 lbs.
Dextrose, ...12 oz.
Citric acid, 50% solution .....1 "
Water to make one gallon,
Color as desired.

A little more or a little less puree may be needed, depending on the time of the year when the puree is made.

Color is vry important. During consumer acceptance tests of sherbets with, and without, color were offered to school children so that they had free choice. Acceptance was 11 to 1 in favor of the well colored sherbet.

By increasing the sugar content to 2 parts to 1 part of fruit an excellent ice cream topping for sundaes was made. This product also gave a fine flavor to malted milks, milk shakes and other fountain drinks.

Tangerine puree containing 2 parts of sugar to 1 part of fruit was tried by Butter Krust Bakeries, Inc., of Lakeland, as a cake filling. This gave excellent flavor to the cakes and will probably be one of the largest uses for this puree.

Hardin's Bakery, at Tuscaloosa, Ala., tried tangerine puree as a cake flavoring material before baking. This was not successful because all tangerine flavor was lost in baking.

Various combinations of dextrose and sucrose were tried during consumer aceptance tests. Dextrose gave good results in all proportions up to 50% of the total sugar used. When more than 50% of dextrose was used the dextrose crystalized

XUM

out on freezing and gave a "bloom" to the puree that looked like mold.

CONCLUSIONS

From the data presented here it is concluded that, under the conditions of these tests, heat sterilized canned tangerine puree does not hold its flavor long enough to be practical as a flavoring material for ices, sherbets and ice cream. It is further concluded that, under the conditions of these tests, frozen tangerine puree holds its flavor without appreciable loss for at least two years and makes an excellent flavoring material for ices, puree, ice cream, cake filling and fountain drinks.

From the fact that, during consumer acceptance tests, the sale of frozen tangerine puree approximately doubled each year for three years, without advertising or promotion, at each of three outlets, it is concluded that frozen tangerine puree is a product that has met with good consumer acceptance.

ACKNOWLEDGEMENT

During the time that some of these tests were being run Mr. Owen W. Bissett, at the USDA Citrus Products Laboratory in Winter Haven, was also working on frozen tangerine puree, along with other citrus purees. Neither of us knew of the work being done by the other. Mr. Bissett called at my laboratory one day and mentioned the work that he was doing on frozen citrus purees. I told him of my work and was glad to adopt several helpful suggestions made by Mr. Bissett.

TWO UF MEN NAMED TO LAND-GRANT COLLEGE ORGANIZATION POSTS

Two University of Florida leaders were named to important posts by the American Association of Land-Grant Colleges and Universities at the annual convention of this group in Washington recently.

President J. Hillis Miller was named a member of the executive committee.

Director Willard M. Fifield of the Agricultural Experiment Stations was chosen to represent the South on the committee of nine members of the Experiment Station section.

Heavy rains in October damaged vegetable crops and flooded pastures and citrus groves in Broward County, according to County Agent B. E. Lawton.

Citrus Radio Show Starts In 17 Cities

The "Citrus Crusaders" quartet, well known singing group of the South, began broadcasting for the Florida citrus industry November 17th in seventeen southern cities.

Sponsored by the Florida Citrus Commission, state citrus promotion agency, the J. Walter Thompson three times weekly in the 17 southern cities.

The one exception to the above schedule is Birmingham, where the quartet will be heard five times a week.

Formerly known as the "Statesmen's Quartet", the group has changed their name to the "Citrus Crusaders" because of the confidence the Commission and its ad agencq, the J. Walter Thompson Company has placed in them by signing them to a 17-city network show exclusively in the southern area.

Ralph M. Henry, Commission ad manager, in announcing the new show, stated: "We are very enthused about sponsoring the "Crusaders" who have a tremendously loyal following in the South. Through the network setup we have achieved, we will be able to maintain a more effective promotion pace in the cities on the network and gain a much more overall result than from scattering our funds."

The "Crusaders" quartet and their pianist is composed of Buddie Parker, Bobby Strickland, Herschel Wooten, Bervin Kendrick, and Dickie Matthews.

A CITRUS BUDWOOD CERTIFICATION PROGRAM FOR FLORIDA

(Continued from page 5)

be voluntary on the part of the nurserymen. However, our Plant Commissioner points out that even under the existing nursery inspection service trees which show symptoms of psorosis or other bud-transmitted diseases cannot be certified for sale. It is the present plan to allow a reasonable time to elapse for the growers and nurserymen to obtain a "clean" source of budwood before this regulation will be enforced. Regardless of whether the nurserymen plan to participate in this certification program they should make every effort to locate disease-free trees to use as a source of budwood so that they will not be in danger of having their nursery stock quarantined. The Plant Board will, upon request, assist any nurseryman in locating and selecting trees for budwood even though they do not care to participate in the program.

The rules and regulations for this program are too voluminous and detailed to be included in this paper. However, anyone interested can obtain complete information by writing to the Florida State Plant Board in Gainesville.

Your committee from the Horticultural Society and all the assisting agencies have cooperated to the fullest extent in formulating a Budwood Certification Program suitable to the needs of the citrus industry of Florida. The State Plant Board has approved this program and is willing to accept the responsibility of administering it. There remains only the matter of finances to make this program operative. Mr. Ed Ayers, Plant Commissioner, advises that he has included $60,000.00 in his Plant Board budget for the next biennium for personnel and money with which to carry on this program. However, monies appropriated for a new budget would not become available until July 1, 1953. It is the consensus of the committee that this program should be started this year at the earliest possible date. Mr. Ayers is in accord with this idea but advises that there is absolutely no money available under his present budget. He estimates that it will require approximately $12,500.00 for land, for test plots, sheds, etc. and for salaries to carry the program until July 1, 1953. It is obvious that this latter amount of money must come from some source other than the funds of the Plant Board if the program is to become operative this year.

Your committee feels that this Citrus Budwood Certification Program is of vital economic importance to the citrus industry of Florida, especially since the announcement of the presence of tristeza in Florida. It behooves all of us to contact our State Senators and Representatives and request them to use their influence to see that the budget of the State Plant Board is approved. By so doing we will assure ourselves, in the not too distant future, of a supply of nursery trees which are vigorous, productive, apparently true to varietal type and free of psorosis and other bud-transmitted diseases.

XUM

Increase In Citrus Red Mite Infestations After The Application of Parathion Spray

HERBERT SPENCER AND
PAUL A. NORMAN[1]

Parathion has come into extensive use on citrus trees in Florida after four years of experimentation by State (Thompson et al., 1950) and U. S. Department of Agriculture entomologists (Spencer et al., 1952) and after numerous trials by grower associations and grove owners. This insecticide has given excellent control of scale insects[2], mealybugs[3], whiteflies[4], the little fire ant[5], and certain insects of lesser importance, but has been found to have certain disadvantages in use.

First, parathion is a very poisonous material, and must be handled and applied with great care. Griffiths and associates (1951) have summarized and illustrated the precautions necessary for its safe use.

Secondly, parathion does not give satisfactory control of the citrus rust mite[6] or the citrus red mite (purple mite)[7]. The problem of control of the citrus rust mite was easily solved by adding wettable sulfur to the parathion spray, but the problem of combined sprays for the simultaneous control of scales, whiteflies, mealybugs, the rust mite, and the red mite is still partially unsolved.

Specer and Osburn (1949) reported that in 1947 applications of DDT, tetraethyl pyrophosphate, and parathion not only did not control red mites completely, but also were followed by increases in infestation. Of 300 square inches of leaf and fruit surface examined on trees that had been sprayed on June 17 and October 21 with 1 quart of 20% parathion emulsion concentrate per 100 gallons of water, 7.6% were infested on September 8, as compared with 2.3% on unsprayed trees. On December 19 the infestation ran 11% for those trees sprayed twice with parathion, as against 2.6% for the unsprayed trees. Since these trees were all in the same grove, were in a carefully planned randomized-block design with 10 replications, and received exactly the same sprays other than the parathion, the conclusion was inescapable that the parathion had brought about this build-up of red mites.

In 1949 a randomized-block experiment was set up in a grove of Temple oranges to study this probable build-up. Ten blocks, or replications, in each of which 2 two-tree groups were randomized. All trees were sprayed in February with zinc sulfate, manganese sulfate, cooper sulfate, hydrated lime, and wettable sulfur. The zinc, manganese, and copper can be expected to favor increases in infestations by both scale insects and citrus red mites. On April 12 half the trees were sprayed post-bloom with a mixture of basic cooper sulfate, wettable sulfur, and 15% wettable parathion at rates of 3, 5, and 2 pounds, respectively, per 100 gallons. The other half received the same spray with the parathion left out. On May 27 high infestations of the citrus red mite had developed throughout the entire experimental block. Therefore, on May 31 half the trees in each group were sprayed with 1% emulsive oil, and half with 1 pound of 25% wettable parathion plus 6 lem further. There were 10 pounds of wettable sulfur per 100 gallons. The red mite infestations were sampled on June 23. A linen tester lens with 1-inch by 1-inch field was applied to 10 upper leaf surfaces, 10 lower leaf surfaces, and 10 fruits on each tree in search for eggs or crawling stages of red mites. If either or both were present the leaf or fruit was tallied as infested. Percentages of infestation for each treatment are derived from 300 such observations. Data from this sampling showed that the emulsive oil spray had controlled the red mites well, but that the infestation had increased in the trees that had received a second spray of parathion (Table 1).

It is clear from Table 1 that parathion in the post-bloom sprays in April did not reduce the red mite infestation materially, since 76% is a high infestation. Statistically, the 76 and 84% levels did not differ significantly. The emulsive oil spray in May gave excellent control. The trees with heavy infestations in this experiment were cleaned up well early in June with a spray of 1 pound of Neotran[8] per 100 gallons of water.

TABLE 1.—Red Mite Infestations on Temple Oranges After Application of Parathion Sprays, 1949.

Sprays (Quantities per 100 Gal.)		Citrus Red Mite Infestations	
April 12*	May 31	May 27	June 23
Parathion (15%) 2 lb.	Parathion (25%) 1 lb., wettable sulfur 6 lb.	76	93
	Emulsive oil 1%	76	5
None	Parathion (25%) 1 lb., wettable sulfur 6 lb.	84	89
	Emulsive oil 1%	84	3

*All trees received basic copper sulfate and wettable sulfur on April 12.

In 1951 additional information was obtained on build-up of citrus red mites after the application of parathion sprays. A grove of Ruby grapefruit trees was arranged for an experiment, with 10 blocks (or replications), in each of which 6 treatments were applied to randomized single-tree plots. On March 30 all trees in the block were sprayed with 2 pounds of copper oxide plus 5 pounds of wettable sulfur (90%) per 100 gallons. One series of trees received no parathion, four received sprays containing 1 pound of 15% parathion, and one 2 pounds of 15% parathion per 100 gallons.

On May 31, two months after the spraying, citrus red mite infestations were 41.6% on trees that had received no parathion, ranged from 66.3 to 72.6% on the four series of trees that had been sprayed with 1 pound of 15% parathion, and 78% for the trees that had

1. United States Department of Agriculture Research Administration, Bureau of Entomology and Plant Quarantine.
2. Lepidosaphes beckii (Newm.) and Chrysomphalus aonidum (L.).
3. Pseudococcus citri (Risso).
4. Dialeurodes citri (Ashm.) and D. citrifolii (Morg.).
5. Wasmannia auropunctata (Roger).
6. Phyllocoptruta oleivora (Ashm.).
7. Paratetranychus citri (McG.).

(Reprinted from The Florida Entomologist Vol. XXXV, No. 3, September, 1952)

8. A wettable powder containing 40% of bis(p-chlorophenoxy) methane.

received 2 pounds. The differences between the values for the parathion-sprayed trees and those for the trees that had received no parathion were highly significant. This is another clear-cut case of build-up of citrus red mites after treatment with parathion.

The results of these three experiments show that delayed increases in infestations of citrus red mites may follow the use of parathion in sprays applied in the post-bloom period, in midsummer, or in the fall. Two applications 49 days apart resulted in higher infestations than a single application, and doubling the amount of parathion per 100 gallons in a single spray also increased the infestation. These heavy infestations may require extra oil sprays for control, or the addition of a miticide to the combination spray containing the parathion or to a subsequent wettable sulfur spray.

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A STUDY OF HESPERIDEN AND NARINGIN FROM CITRUS FRUITS

(Continued from page 7)

studied decreased percentagewise with respect to weight of the fruit.

2. No correlation could be found between the change in glucoside content, distribution, percent in juice and the maturity of the fruit. The glucoside content of the orange samples varied between 0.015 and 0.025 percent, while the grapefruit varieties ranged from 0.016 to 0.036 percent.

3. The unusually high glucoside content of small fruit on a dry weight basis suggested that it may have an important physiological role in citrus fruit metabolism.

4. From 75 to 80 percent of the glucoside found in the four varieties of orange was concentrated in the albedo, rag and pulp, while in the grapefruit varieties 90 percent was found in this same portion of the fruit.

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CALIFORNIA-ARIZONA LEMON ADMINISTRATIVE COMMITTEE IS NAMED

The U. S. Department of Agriculture has named members and alternate members of the Lemon Administrative Committee to serve under the amended marketing agreement and order program for California-Arizona lemons, during the two-year period ending October 31, 1954. The Committee, members and alternates, include the following:

Willard B. Perry, Camarillo, Calif., member; W. C. Ward, Oxnard, Calif., alternate; Glen Shepherd, Etiwanda, Calif., member; Walter D. Emery, Porterville, Calif., alternate; John J. Gain, Escondido, Calif., member; L. W. Fowler, Santa Barbara, Calif., alternate; C. P. Strickland, Santa Paula, Calif., member; Lawrence Mehren, Peoria, Ariz., alternate; Glen A. Harris, La Habra, Calif., member; Jack Singer, Claremont, Calif., alternate.

One of the principal functions of the Lemon Administrative Committee is to recommend to the Secretary of Agriculture, after investigation of supply and demand conditions, the quantity of lemons which should be shipped weekly.

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Rail Refrigeration Test With Florida Citrus - November, 1950

J. R. WINSTON, Senior Horticulturist;
RANDALL CUBBEGE, Scientific Aid;
H. W. HRUSCHKA, Asso. Physiologist;
G. A. MECKSTROTH, Asso. Pathologist

(Continued From Last Issue)

Car C

This test differs from that in car B in that the bunkers of car C were replenished at Hamlet and the vents were kept closed to destination.

The average comodity temperature during loading was 84.0°F. At Wildwood the average temperature was 67.2°, at Savannah 59.9°, at Hamlet 52.5°, at Potomac Yards 47.2°, and on arrival at Jersey City (Greenville Yards) the third day after loading the average commodity temperature was 44.9°.

The spread in commodity temperature was from 15 to 20 degrees or more throughout most of the transit period, and not less than 6 degrees at the end of the holding period. Car C was a non-fan car. The bottom layer was the coldest part of the load at all times, and the top layer the warmest. The temperature reduction in the top and middle layers progressed at a fairly uniform rate. The top of the load was from 3 to 7 degrees warmer than the middle layer at times except at Wildwood before the ice was supplied and vents closed. The warmest part of the load fell to 60°F. by noon of the second day after loading, somewhat north of Raleigh, but 50° was not reached until after the car had reached Jersey City. On arrival at Jersey City, the bottom of the load averaged 36.1° and the top 52.8°. At unloading five days later, the bottom of the load averaged about 34° and the top of the load about 41°, and the grand average was about 1 degree warmer than that of car B.

The car was initially iced with 9,600 pounds. On arrival at Hamlet approximately 6,000 pounds remained and 3,600 pounds were supplied to replenish the bunkers. On [illegible]rds there was 7,200 pounds of ice left and 6,400 pounds was left at Jersey City for a total ice meltage of 6,800 pounds during the transit period of four days. Five days

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Plants grow by the chemical actions of mineral nutrients, sunlight, water and carbon dioxide. The key to the combination is *chlorophyll*, the green plant substance that is essential for all plant life. Chlorophyll draws from the sun the energy needed for plant growth. Formation of chlorophyll in the plant depends on *magnesium*. If insufficient magnesium is available to the citrus tree, a typical deficiency symptom is a loss of the normal green color in the leaves. Magnesium-deficient citrus trees shed leaves in late summer or fall, leaving the fruit unprotected. The defoliated twigs become weak, subject to fungus infection and usually die. Magnesium deficiency symptoms are a warning signal that the chlorophyll content of the citrus tree is too low to capture enough of the sun's energy for healthy crop growth.

Experience shows that the most effective and economical way to supply the magnesium needed by citrus trees is in soluble form in mixed fertilizers. *Sul-Po-Mag* is a properly balanced combination of magnesium and potash, both in *sulfate form*, water soluble and immediately available to the crop. Leading manufacturers are now including *Sul-Po-Mag* in their mixed fertilizers for the profitable production of citrus.

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- Magnesium concentrates in the seed with phosphorus to aid in the formation of oils and proteins required for viable seed.
- Magnesium functions as a carrier of phosphates to the actively growing and fruiting parts of the plant.
- Magnesium is required to activate the processes which stimulate the production and transport of carbohydrates and proteins within the growing plant.
- Magnesium, in sufficient quantities, enables the plant to utilize other plant nutrients for healthy, disease-resistant growth.
- Magnesium stimulates the growth of soil bacteria and increases the nitrogen-fixing power of legumes.

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later, when the car was unloaded, 3,200 pounds of ice remained. During this holding period, the vents were kept closed.

Car D

This test differed from that in car B only in that the vents were opened the evening before those of car B. At Savannah where the outside temperature was 24°F., the vents of this car were opened to let in the cold night air. The following morning, on arrival at Hamlet where the outside air temperature was 15°, the diagonal vents were closed to retard the rate of cooling. At Raleigh about four hours later when the outside air temperature was 27°, these closed vents were reopened.

The comodity temperature during loading was 71°F. At Wildwood the average commodity temperature was 68°, at Savannah it was 60.1°, at Hamlet 36.6°, an overnight reduction in temperature of 23.5 degrees, at Potomac Yards it was 35.2°, and at Newark (Waverly) during unloading in the night of the third day after loading, the commodity temperature averaged 38.6°. The spread in commodity temperature in this non-fan car during the second day after loading when it was reduced to about 10 degrees and remained at or near that level. The warmest part of the load reached 60° before the car passed Charleston, South Carolina, and seven hours later it was 50°. During the greater part of the transit period north of Savannah the middle layer was warmer than the top and the difference was greatest, as much as 18 degrees, at Hamlet. At Potomac Yards, the coldest part of the load averaged slightly below 30° and the warmest, the middle, slightly above 40°. At unloading during the fourth night after loading the coldest layer averaged slightly below 30° and the warmest, the top, about 43°. The most rapid rate of cooling occurred between Savannah and Hamlet when all vents were open during the coldest part of the trip while the outside air temperature dropped from 24° to 15°. The night air was so effective in cooling the load that when Hamlet was reached the average temperature in the top of the load was less than 2 degrees warmer than the average of the bottom layer; at Hamlet the coldest location of the load, the bottom bunker position, was 27.7°; the bottom quarterlength was 27.8°. The coldest location in the top of the load was the top quarterlength position, 29.7°, whereas the coldest part of the middle layer, the middle bunker, was 43.9°. After fruit temperature records were made at Hamlet, it was decided to lessen the flow of air through the car by closing the diagonal vents, thereby avoiding further cooling of the commodity in the coldest locations. They were left closed about four hours until the outside air temperature had risen to 27.°, when they were opened again at Raleigh. During this four hour period there was little change in commodity temperature in the coldest locations. Although these low commodity temperatures approached the danger point, no freezing injury was detected in the fruit at unloading.

This car was initially iced with 9,600 pounds. At Hamlet there was approximately 8,000 pounds of ice remaining; at Potomac Yards, 5,800 pounds; and at Newark, when the car was unloaded, slightly less than three days after icing, 5,000 pounds of ice remained. Thus, approximately 4,600 pounds of ice was melted during the transit period.

Car E

This test was with crated oranges loaded in a pre-iced fan car, re-iced only once, at Hamlet, and the vents were kept closed to destination.

The average commodity temperature at loading was 77.5°F. At Wildwood it was 67.9°; at Savannah 58.7°; at Hamlet 53.7°; at Potomac Yards 43.0°; and at unloading in New York City, the fourth night after loading, the average comodity temperature was 40.2°.

After the car left Wildwood the spread in temperature within the load ranged from 5 to 7 degrees. The top of the load was cooler than the middle or bottom from Baldwin north, whereas the temperatures in the middle and top crates ran closely parallel from that point to destination.

The warmest part of the load reached 60°F. somewhat north of Savannah during early evening of the day following loading and 50° was reached about 18 hours later when the train was in Southern Virginia, and 45° at Potomac Yards. During the next 24 hours the temperature in the warmest part of the load was reduced only 3 or 4 degrees with about 1 degree reduction in the top of the load. At unloading the coldest layer averaged approximately 38° and the warmest 42°.

This car was pre-iced with 9,600 pounds. On arrival at Hamlet only 1,200 pounds of ice remained, there the bunkers were replenished with 8,400 pounds. On arrival at Potomac Yards, 7,200 pounds of ice remained in the bunkers whereas at New York, about 24 hours later or three and a half days after loading, 6,400 pounds of ice was left. Thus, during this three and a half days transit period there was a total ice meltage of 11,600 pounds.

Car F

Car F, with crated oranges in a pre-iced car, was precooled six hours with Preco fans at loading point, and the bunkers were replinshed at Wildwood, the first icing station reached en route.

The average temperature of the fruit was 81.5° as it entered the car. Loading extended over a period of approximately four hours during which time the car fans were not operating and the fruit in the bottom layer of boxes cooled 12 degrees whereas that in the top and middle layers cooled less than 2 degrees.

At the end of the first hour of precooling the delivery air was 49.5°F. and was 20.8° degrees cooler than the return air; at the end of the sixth hour the delivery air had risen a few degrees to 53° and was only 13.3 degrees colder than the return air, due in part at least to less ice surface to cool the air. During the six-hour precooling period the bottom of the load which had cooled 12 degrees during loading cooled only 1.18 degrees whereas the middle and top

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layers lost 15.8 and 22.7, respectively, resulting in an average temperature reduction for the car of 13.4 degrees.

At the end of the precooling period, there was a spread in temperature of 9.6 degrees between the top and bottom layers of crates, i. e., coolest and warmest layers. The fan levers were then placed at the "on" position prior to moving the car to Wildwood. About nine and one-half hours later this car reached Wildwood, 22 miles distant, where the bunkers were replenished with 8,500 pounds. By that time, due to slow car and fan movement, the temperature in the top layer of crates had risen 0.7 degrees, and 1 degree in the middle crate whereas the bottom layer had cooled about 9 degrees, to approximately the same level as that of the top layer. During the interval between loading and arrival at Wildwood, the average temperature of the load had cooled from 81.5°F., to 60.6°, a reduction of 20.9 degrees. By the time the car reached Savannah, its average temperature was 51.1°; at Hamlet 45.7°; at Potomac Yards 42.6°; and at New York City, the third night after loading, the commodity temperature averaged 41.3°.

During the transit period, there was a spread in commodity temperature as high as 9 degrees between the coldest and the warmest parts of the load. The top layer, due to fan action during precooling and in transit was the coldest throughout the transit period with the bottom layer the warmest during most of that period. The warmest layer (middle, temporarily) did not reach 60°F. until mid-morning of the day after loading before the car reached Baldwin, whereas an average of 50° in the warmest layer (bottom) was not reached until soon after the second midnight after loading.

Thereafter, all parts of the load were in the 40's. At unloading, during the fourth night after loading, the bottom and middle layers, the warmest parts of the load, were about 42°.

This car was pre-iced with 9,600 pounds and the bunkers were replenished at Wildwood with 8,500 pounds. At Potomac Yards, 1,900 pounds of ice remained whereas at unloading three and a half days after loading, 1,000 pounds was unmelted from the 18,100 pounds of ice supplied. making a total ice meltage of 17,100 pounds.

Car G

This test in a fan car loaded with oranges in open mesh bags over two layers of wirebound crates, was initially iced after loading. The vents were kept closed from Wildwood until Hamlet was reached about 25 hours later. There, because of the low outside air temperature, only diagonal vents were opened and at Raleigh, some four hours later, all vents were opened and kept open until reaching Potomac Yards, where the car was changed to standard ventilation service.

The average comodity temperature was 78.3.F. during loading. On arrival at Wildwood it was 71.4°; at Savannah 57.6°; at Hamlet 50.1°; and at Potomac Yards 39.2°. On arrival at Jersey City (Greenville Yards) the afternoon of the third day after loading, the commodity temperatures averaged 39.2°. This car was held five days at Harlem River before unloading and at no time did the average commodity temperature rise above 38.2°.

The top layer was the coldest part of the load, and the bottom layer was 1 or 2 degrees warmer than the middle layer during most of the transit period.

The spread in temperature between the coldest and warmest fruit was about 10 degrees during the day after loading, becoming less as the trip continued. On arrival at Potomac Yards, the spread was 5 degrees or less and continued to diminish.

The warmest part of the load reached 60°F. during the evening of the day after loading soon after leaving Savannah, whereas 50° was reached slightly north of Raleigh, the second morning after loading, and below 40° during early afternoon of the third day after loading. During the holding period, there was not much change in commodity temperature. At unloading, six days after reaching the New York area, the commodity temperature ranged between 36.0° and 40.0°.

This car was supplied with 8,000 pounds of ice after loading. On arrival at Hamlet 2,400 pounds remained; at Potomac Yards 1,900 pounds; and at New York City, four days after loading, 1,000 pounds remained, resulting in a total ice meltage of 7,000 pounds. At unloading, six days later, there was still a trace of ice in the

(Continued on page 18)

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The LYONIZER

Department

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Reports Of Our Field Men . . .

NORTH HILLSBOROUGH AND PINELLAS COUNTIES
J. A. Hoffman

In the past month growers have started their fall application of fertilizer and Fall cultivation. Weather conditions have been fair with a normal amount of rain mixed with some cool weather.

The movement of early oranges has begun with most packers in full swing, while prices are not very satisfactory to growers.

Red spider and rust mite have been quite active in this section and growers are taking advantage of the early morning dew by dusting for control.

Ranchers have been busy with their combines and bailers during the past month harvesting seeds of various varieties and storing hay for the winter months ahead. Good production of seed and hay have been reported from most ranchers.

A few farmers have begun the digging of sweet potatoes and report satisfactory yields with better than average prices. Extensive study and help from various agencies have given farmers new light in this section and many farmers are using every acre available for agricultural purposes.

PASCO AND E. HILLSBOROUGH
E. A. McCartney

The past month has been growing weather. Fruit is moving in about the same volume as last year at this time.

The early fall application of fertilizer has been put on the groves, but there will be considerable late fertilizer applied in December.

Vegetables have not been hurt by the low temperature this past week, but prices have been low and the growers are hoping for a change for the better.

Cattlemen are not so happy about prices, but most have good pastures so they can hold at least for some time.

WEST CENTRAL FLORIDA
J. E. Mickler

Fruit has been coloring nicely here in the past month and picking has been general. The Fall applications have been going on and the first of December will see most fertilizer applications finished. Rainfall has been spotty and while no severe moisture shortage is being felt yet, this section would welcome a good rain. There has been no cold damage, light frosts merely adding zip to the air. Pasture grasses have suffered somewhat, but in general well kept pastures have held very nicely.

SOUTHWEST FLORIDA
Eaves Allison

To say that crops are looking good now would be an overstatement, although some few acreages of tomatoes do look pretty fine. Mostly, however, the heavy rains of last month have left crops which show the havoc wrought by the continued flooding. While it is probable that most growers will "come out" the reduction in volume and quality will preclude making any money on this go 'round.

Flower quality has suffered also in the first cuttings of gladiolus and there has been difficulty in preparing the wet fields in time for scheduled plantings.

Citrus is moving, with early varieties being spot-picked where it will stand the test. If you will eat some you will see why the price goes down when it hits the market.

POLK AND HIGHLANDS COUNTIES
J. T. Griffiths and J. K. Enzor, Jr.

Approximately 2 to 3 inches of rain fell on November 20 throughout Polk County. Although no one was suffering for moisture, the rains were most welcome and should carry groves well into December. Early oranges are continuing to show some blossom-end rot and drop has continued in many groves. So far very little pineapple drop has been noted.

The pink pitting of grapefruit which was mentioned last month is still general and is relatively severe in some groves. However, this has been less severe than a year ago.

Purple mites are becoming common and DN is being used in some groves. In a few groves purple scale has become heavy enough to warrant the fall application of parathion. Red scale has caused little trouble this fall.

Almost all fall fertilizer has been applied and citrus groves are generally in good condition.

SOUTH POLK, HIGHLANDS, DESOTO AND HARDEE COUNTIES
C. R. Wingfield

The heavy rains of October have left the citrus groves in splendid condition and with very little tree damage. There has been some droppage of fruit but it cannot be contributed in all cases to excessive water for there is some that is caused from blossom-end rot and scale. It might be well to check these causes. Also there should be a close check on rust mite and purple mite that is appearing in quantities to cause leaf drop.

Fertilizing has gotten under way but some have been a little slow getting started and are waiting to see what will be realized from the fruit. It would be advisable not to wait until the ground begins to get cold for the tree will not assimilate the plant food as rapidly and will need the plant food for spring flush of growth.

The vegetable crops have been badly hurt from rains in most sections. While there is some cucumbers, peppers and tomatoes being brought into the markets the yields are very low. Where possible more hardy crops are being planted for winter harvest. There are some new plantings of beans in the Lake Section that are being picked now. Corn and radish are also being harvested.

NORTH CENTRAL FLORIDA
V. E. Bourland

We are having cool, dry weather and groves are showing need of rain very badly. The different insects are active, but not so many in number, nevertheless growers should keep a close check on their groves for damage. Fruit market is still unsatisfactory to growers, however, there is a lot of fruit being moved, and it has colored up nicely due to the cool weather, but is running small, and yield in most groves is lighter than usual.

Quite a number of tangerines being picked, and market is good so far. Most growers have their groves worked up in good condition, and lots of them have put on their fall application of fertilizer.

XUM

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Uncle Bill Says:

Seems like now that all the elections is over for the time bein' that we could all git busy tendin' to our jobs . . . and incidentally they ain't many jobs much more important to the human race than the job of producin' foodstuffs for the world . . . and mighty few, if any, other sections of the country is doin' a better peice of work along this line than us folks right here in Florida.

When you stop to think of all the health-givin' citrus fruit we raise in this state, and add to that the tremendous volume of vegetables which is raised in Florida and used in nearly every section of our country, and then add once more the big amount of beef that is produced in our home state it ain't hard to understand why lots of folks say we're the market basket of the nation . . . and we haven't mentioned a lot of other things like sugar 'n melons and a heap of other good eatin' stuff that's grown in this here Sunshine State.

'Coure we couldn't do all this without havin' an ideal climate to help our production . . . and likewise we just couldn't begin to raise either the big quantity or the high quality of food stuff we raise without the help of good fertilizer . . . a fact which every grower in Florida is well acquainted with.

And talkin' about fertilizer they's a lot of things said about all the good fertilizers manufactured and sold in Florida, but the real proof of the goodness of any fertilizer is best proved by the sort of fruit, vegetables and pastures any fertilizer help raise fer the users.

It's this ability to demonstrate its excellence in the products it produces that makes Lyons Fertilizers so popular with so many of Florida's growers all over the state.

And while it may be a bit early we want to tell you all that we're wishin' you and yours a most Merry Christmas and a Happy, Prosperous New Year.

RAIL REFRIGERATION TEST ON FLORIDA CITRUS — NOV. 1950

(Continued from page 15)

bunkers.

Comparison of Protective Services

Cars A and B provided a comparison of fan and non-fan double deck cars, loaded with oranges. The test clearly showed the advantages to be derived from the use of fans. Although the average temperatures in the two cars were about the same there was much wider spread between maximum and minimum commodity temperatures in non-fan car B than in fan car A, when the vents were closed, i. e., south of Hamlet, with vents opened, the spread was reduced.

Cars B and C were non-fan double deck cars loaded with oranges in open mesh bags. Car B was not re-iced in transit, but was vented at Hamlet, whereas car C was re-iced at Hamlet and the vents were kept closed to destination. There was practically no difference in temperatures in these cars as far north as Hamlet. Immediately beyond that point, temperature reduction was more rapid in the top and middle layers in car B, thus indicating that ventilation north of Hamlet under weather conditions as prevailed during this test, resulted in more rapid cooling than did replenishing the bunkers with ice and keeping the vents closed to destination.

Cars B and D. These double deck cars, loaded with open mesh bags were initialy iced and varied only in ventilation. Car D was vented at Savannah, whereas car B was run to Hamlet before the vents were opened. Both cars received the same service thereafter.

The reduction in average fruit temperatures was about the same for both cars as far as Savannah, but after opening the vents on car D, its temperatures dropped sharply, the average being 18.7 degrees lower than car B upon arrival at Hamlet. With both cars being handled the same thereafter, temperatures were more nearly the same upon arrival at destination. Total ice meltage was about the same but car D used much less ice to Hamlet because of the open vents from Savannah to Hamlet in sub-freezing weather.

Cars C and D, both non-fan double deck cars, were also loaded with oranges in open mesh bags. The former was re-iced at Hamlet and its vents were kept closed to destination, whereas the latter car was not re-iced but converted to ventilation at Savannah. Temperature reduction in these two cars were almost identical as far as Savannah. Beyond that point the commodity in car D cooled much more rapidly than that in car C. The top of the load in car C cooled 5.3 degrees during the night between Savannah and Hamlet while that in vented car D cooled 36 degrees. When unloaded, the warmest part of re-iced car D was about 8 degrees cooler than the warmest part of the load in car C which was not rei-iced.

(Concluded Next Issue)

SPANISH CITRUS GROWER STUDIES FLORIDA CITRUS

The Orlando Morning Sentinel recently carried this story of a Spanish Grandee who came to Florida to study citrus as it is being produced in Florida:

"A distinguished visitor from the orange groves of Spain is spending several days in Orlando on a mission which may result in Dream Navel oranges, the exclusive product of an Orlandoan, finding a place in Spanish citrus groves.

"He is Ernesto Bauman, wealthy citrus grower, rancher and writer, who operates a 160-acre orange and grapefruit grove near Valencia, Spain. Bauman is the guest of Donald J. Nicholson, 1224 Palmer Ave., exclusive producer of the Dream Navel orange. Bauman had heard of the Dream Navel and made a special trip to Florida to find out more about it.

"Bauman expressed himself as enthusiastic over the unlimited opportunities presented by Florida's soils, lakes and climate and predicted that the state can take world leadership in citrus production and marketing."

Mr. Nicholson states emphatically that he is not a commercial nurseryman, but instead is a developer and plant breeder of new types of citrus fruits and new citrus rootstocks, and that he is not interested personally in growing and selling nursery stock.

WHAT THEY LIKE

Oranges and apples are the top favorite fruits of homemakers, according to results of interviews carried out by the United States Department of Agriculture. Approximately 80 per cent of all homemakers said they prferred one fruit above all others. Among these, one out of three preferred apples. About the same proportion favored oranges. The remaining third had scattered preferences among other deciduous and citrus fruits.

Classified Ads

FOR SALE — THE BEST QUALITY CITRUS TREES. Several thousand Temple, Citra Pineapple, Pink Seedless and Red Grapefruit trees on Sour Orange root. Contact Frank K. Chase, Telephone 84-501, Auburndale, Florida.

SUPERIOR CITRUS TREES—Now available on Rough Lemon, Sour Orange, Sweet Orange, and Cleo Rootstocks. Prices $1.10 up, depending on the size and number ordered. Also Seedlings for lining out of all varieties. Write for 'Tips to Growers".

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New Insecticide Plant Opened In Tampa . . .

As part of its nation-wide expansion program, the Stauffer Chemical Company announces the opening this month of its modern new insecticide plant at Tampa.

Sprawling over 22 acres in the middle of a 50 acre tract just east of Tampa, this newest addition to Florida industry produces oil emulsions and lime sulfur solution. In addition, a modern high-capacity dust mixing unit has been installed. 35 to 40 persons will be employed. Two large warehouses will store approximately 4,000 tons of the various fungicides and insecticides so vital to the citrus grower in combating the many Florida crop pests.

Stauffer expanded into this state over ten years ago because it had watched the phenomenal growth of Florida and was aware of its many potentialities. During this period rapid progress has been made in meeting the challenge of Florida's agricultural requirements. At the new plant Stauffer will follow the good neighbor policy which has long been an important factor of successful management in the other communities where the company operates.

Recognized as a leader in the field of agricultural and industrial chemicals, Stauffer is a major producer of finished sulfurs. The company also manufacturers Benzene Hexachloride, DDT and many other products used in the agricultural and industrial world. Through a consistently sustained research program in Stauffer's well-equipped research laboratories, the company has pioneered in such fields as rubbermakers' sulfurs, insecticides, defoliants, carbon bisulfide, and certain chlorides of rare metals. The development of the company from its inception in 1885 parallels the remarkable growth and achievements of the American chemical industry through this period.

Today Stauffer and its subsidiaries operate over 35 plants in every section of the country. Florida headquarters are at Apopka while the division office is in New York and the home office is in San Francisco. The Stauffer management looks forward to making additional friends in Florida and to a continued long and happy association here.

DEMONSTRATION AGENT IN LAKE HONORED FOR DISTINGUISHED SERVICE

Mrs. Lucie K. Miller, Lake County home demonstration agent for the past 17 years, received the distinguished service award of the National Home Demonstration Agents' Association at the group's annual meeting in Chicago recently.

She was one of the 55 home demonstration agents in the United States to receive the coveted honor.

A native of Leesburg, Mrs. Miller has been a leader in Extension work with rural families through home demonstration and girls' 4-H clubs and community activities.

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